

Rocky Mountain Spotted Fever



Section 1:

ABOUT THE DISEASE

A. Etiologic Agent

Rocky Mountain spotted fever (RMSF) is caused by the bacterium *Rickettsia rickettsii*.

B. Clinical Description

The onset of RMSF is sudden. Cases usually present with a moderate to high fever, significant malaise, muscle pain, headache, chills, and eye inflammation. Over half of cases develop a rash or small bruises on the arms and legs, which typically begins 2–6 days after the onset of illness. The rash spreads to much of the body, including the palms and soles. Among untreated individuals, these signs and symptoms typically persist for 2–3 weeks, and the case-fatality rate ranges from 13–25%. More advanced manifestations include loss of red blood cells (anemia) and platelets (thrombocytopenia), severe clotting disorders, damage to the major organ systems, and shock. If the disease is promptly recognized and treated, death is uncommon. However, overall in the U.S., the reported case-fatality rate for RMSF has been 3–5% in recent years.

C. Vectors and Reservoirs

In Massachusetts, the primary vector for RMSF is the dog tick (*Dermacentor variabilis*), which also serves as a reservoir. Among ticks, *R. rickettsii* is spread transovarially (adult tick to egg) and transstadially (between life stages). While several small wild animals, as well as dogs, may have antibodies to *R. rickettsii*, their role as possible reservoirs in the maintenance of RMSF is uncertain.

D. Modes of Transmission

RMSF is acquired from the bite of an infected tick. Laboratory data suggest that the tick must remain attached for at least 4–6 hours before the transmission of *R. rickettsii* can occur.

E. Incubation Period

Signs of RMSF typically develop 1 week after exposure (range 3–14 days). The length of the incubation period is associated with the magnitude of exposure to *R. rickettsii* (more exposure, shorter incubation period).

F. Period of Communicability or Infectious Period

RMSF is not communicable from person to person.

G. Epidemiology

RMSF is widespread in the U.S., with most cases reported from the southern and midwestern states. RMSF is relatively rare in Massachusetts, with cases occurring most frequently in the southeastern part of the state and on the Cape and the Islands. RMSF incidence rises between April and October, when the risk of contact with ticks is greatest. The risk of mortality from RMSF is higher for men, people over the age of 40, non-whites, individuals who do not develop

(or recognize) the typical rash, and individuals with no reported history of a tick bite. As children tend to have more contact with tick-infested areas, most reported cases are in people under the age of 15 years. While rare, accidental transmission in the laboratory setting has been reported.

H. Bioterrorist Potential

This pathogen is not considered to be of risk for use in bioterrorism.



Section 2:

REPORTING CRITERIA AND LABORATORY TESTING

A. What to Report to the Massachusetts Department of Public Health (MDPH)

Report any clinically suspect cases of RMSF called to your attention by a health care provider or any positive laboratory test result pertaining to RMSF.

Note: See Section 3C for information on how to report a case.

B. Laboratory Testing Services Available

The MDPH State Laboratory Institute (SLI), Viral Serology Laboratory will perform serologic testing for infection with *R. rickettsii*, the agent of RMSF, and for *R. typhi*, the agent of typhus (a zoonotic disease which is not spread by ticks but may have clinical similarities to RMSF) by IFA. Paired specimens (≥ 2 mL of serum) are preferable.

For more information on specimen submission, call the SLI Viral Serology Laboratory at (617) 983-6396.

*Note: The SLI does not provide services for tick identification or testing of ticks for *R. rickettsii*. See Section 4C for further information.*



Section 3:

REPORTING RESPONSIBILITIES AND CASE INVESTIGATION

A. Purpose of Surveillance and Reporting

- ◆ To identify where RMSF occurs in Massachusetts, and to recognize areas in Massachusetts where RMSF incidence has changed (increased or decreased).
- ◆ To focus preventive education.
- ◆ To target tick control measures.

B. Laboratory and Health Care Provider Reporting Requirements

RMSF is reportable to the local board of health (LBOH). The MDPH requests that health care providers immediately report to the LBOH in the community where the case is diagnosed, all confirmed or suspect cases of RMSF, as defined by the reporting criteria in Section 2A.

Laboratories performing examinations on any specimens derived from Massachusetts residents that yield evidence of *R. rickettsii* infection shall report such evidence of infection directly to the MDPH within 24 hours.

C. Local Board of Health (LBOH) Reporting and Follow-Up Responsibilities

Reporting Requirements

MDPH regulations (*105 CMR 300.000*) stipulate that RMSF is reportable to the LBOH and that each LBOH must report any case of RMSF or suspect case of RMSF, as defined by the reporting criteria in Section 2A. Cases should be reported to the MDPH Bureau of Communicable Disease Control, Office of Integrated Surveillance and Informatics Services (ISIS) using a MDPH *Rocky Mountain Spotted Fever Case Report Form* (found at the end of this chapter). Refer to the *Local Board of Health Timeline* at the end of this manual's *Introduction* section for information on prioritization and timeliness requirements of reporting and case investigation.

Case Investigation

1. It is the responsibility of the LBOH to complete a MDPH *Rocky Mountain Spotted Fever Case Report Form* (found at the end of this chapter) by interviewing the case and others who may be able to provide pertinent information. Much of the information required on the form can be obtained from the health care provider or from the medical record.
2. Use the following guidelines to assist in completing the form:
 - a. Demographic information: Accurately record the demographic information.
 - b. Clinical information: Accurately record clinical information, including date of symptom onset, symptoms, complications, whether the case is pregnant or immunosuppressed, treatment information, whether hospitalized (and associated dates), health care provider information, and outcome of disease (e.g., recovered, died).
 - c. Laboratory information: Check off all appropriate tests performed, and attach a copy of any laboratory results.
 - d. Exposure information: Use the incubation period range for RMSF (3–14 days). Specifically, focus on the period beginning a minimum of 3 days prior to the case's onset date back to no more than 14 days before onset for the following exposures:
 - i. Tick bite history: Determine if the case was bitten by a tick. If yes, record date(s) and geographic location(s) where case was bitten.
 - ii. Travel history: Determine the geographic area(s) traveled to by the case, including dates traveled.
 - e. If you have made several attempts to obtain case information but have been unsuccessful (e.g., the case or health care provider does not return your calls or respond to a letter, or the case refuses to divulge information or is too ill to be interviewed), please fill out the form with as much information as you have gathered. Please note on the form the reason(s) why it could not be filled out completely.

3. After completing the form, attach laboratory report(s) and fax or mail (in an envelope marked “Confidential”) to ISIS. The confidential fax number is (617) 983-6813. Call ISIS at (617) 983-6801 to confirm receipt of your fax. The mailing address is:

MDPH, Office of Integrated Surveillance and Informatics Services (ISIS)
305 South Street, 5th Floor
Jamaica Plain, MA 02130
Fax: (617) 983-6813

4. Institution of disease control measures is an integral part of case investigation. It is the responsibility of the LBOH to understand, and if necessary, institute the control guidelines listed in Section 4.



Section 4:

CONTROLLING FURTHER SPREAD

A. Isolation and Quarantine Requirements (*105 CMR 300.200*)

None.

B. Protection of Contacts of a Case

None.

C. Managing Special Situations

Response to a Tick Bite

The longer a tick remains attached to someone, the higher the likelihood of disease transmission. Individuals should promptly remove any attached tick using fine-point tweezers. The tick should not be squeezed or twisted, but grasped close to the skin and pulled straight out using steady pressure. Whenever an attached tick is removed from the body, one should monitor one's health for the appearance of rash, fever, or flu-like symptoms, and should immediately seek the advice of a health care provider should any symptoms occur, especially if the tick was attached for more than 24 hours. It may be helpful to save the tick after removal for two reasons: 1) if the person who was bitten goes on to develop signs or symptoms such as fever, flu-like symptoms, or a rash, it may be helpful for the physician to know the type of tick; and 2) depending on the circumstances of the bite (i.e., when a person was bitten, the type of tick, how long it was attached), a physician may choose to treat the person who was bitten. The tick may be kept either securely sealed in a small plastic bag or attached, with clear tape, to a piece of paper. For individuals who do not wish to keep the tick, it can be either drowned in alcohol or flushed down the toilet.

The MDPH does not provide either tick identification or tick testing services. A listing of agencies that provide these services for a fee is available on the MDPH website at www.mass.gov/dph/cdc/epii/lyme/lymehp.htm.

If an individual chooses to have the tick tested, the following information should be taken into account:

- ◆ Tests performed on the ticks are not perfect, and they do not test for all infections that ticks may carry. Therefore, even with a negative result, people should still monitor for the appearance of rash, fever, or other unusual symptoms and should immediately seek the advice of a health care provider should any symptoms occur.
- ◆ If someone has been infected by a tick bite, symptoms may begin to occur even before the results of tick testing are available. People should not wait for tick testing results before seeking medical advice, should any symptoms develop.
- ◆ A positive test on a tick is not an automatic indication that treatment is needed. A positive test indicates that the tick was infected but not that the tick was successful in spreading the infection to the person bitten. The longer a tick is attached, the greater the chance that it will spread infection. Positive test results should be discussed with a health care provider.

D. Preventive Measures

Environmental Measures

Prevention of RMSF, along with other diseases spread by ticks, involves making the yard less attractive to ticks.

- ◆ Keep grass cut short.
- ◆ Remove leaf litter and brush from around the yard.
- ◆ Prune low lying bushes to let in more sunlight.
- ◆ Keep woodpiles and bird feeders off the ground and away from the home.
- ◆ Keep the plants around stone walls cut short.
- ◆ Use a three-foot wide woodchip, mulch, or gravel barrier where the lawn meets the woods, and remind children not to cross that barrier.
- ◆ Ask a landscaper or local nursery about plants to use in the yard that do not attract deer.
- ◆ Use deer fencing (for yards 15 acres or more).

If an individual chooses to use a pesticide to reduce the number of ticks on his/her property, he/she should be advised to hire a licensed applicator who is experienced with tick control. A local landscaper or arborist may be a licensed applicator. In general, good tick control can be achieved with no more than two pesticide applications in any year. Advise individuals to ask, when selecting an applicator, if they will provide:

- ◆ A written pest control plan that includes information on the pesticide to be used.
- ◆ Information about non-chemical pest control alternatives.
- ◆ Signs to be posted around the property after the application.

Personal Preventive Measures/Education

There is no vaccine to protect against RMSF. If someone lives, works, or spends leisure time in an area likely to have dog ticks, they should be advised of the following:

- ◆ The single most important thing to prevent a tick-borne disease is to check for ticks once a day. Favorite places ticks like to go on the body include areas between the toes, back of the knees, groin, armpits, neck, along the hairline, and behind the ears. Remember to also check children and pets. Promptly remove any attached tick using fine-point tweezers. The tick should not be squeezed or twisted, but grasped close to the skin and pulled straight out using steady pressure.

- ◆ Stick to main pathways and the centers of trails when hiking.
- ◆ Wear long-sleeved, light colored shirts and long pants tucked into socks.
- ◆ Talk to a veterinarian about the best ways to protect pets and livestock from ticks.
- ◆ Use repellents containing DEET (N,N-diethyl-m-toluamide), and choose a product that will provide sufficient protection for the amount of time spent outdoors. Product labels often indicate the length of time that one can expect protection from a product. DEET is considered safe when used according to the manufacturer's directions. The efficacy of DEET levels off at a concentration of 30%, which is the highest concentration recommended for children and adults. DEET products should not be used on children less than two months of age. Mosquito netting may be used to cover infant carriers or to protect other areas for children less than two months of age. The following precautions should be observed when using DEET products:
 - Avoid using DEET products that combine the repellent with a sunscreen. Sunscreens may need to be reapplied too often, resulting in an over application of DEET.
 - Apply DEET on exposed skin, using only as much as needed.
 - Do not use DEET on the hands of young children, and avoid applying repellent to areas around the eyes and mouth.
 - Do not use DEET over cuts, wounds, or irritated skin.
 - Wash treated skin with soap and water after returning indoors, and wash treated clothing.
 - Avoid spraying DEET products in enclosed areas.

Permethrin-containing products will kill mosquitoes and ticks on contact. Permethrin products are not designed to be applied to the skin. Clothing should be treated and allowed to dry in a well-ventilated area prior to wearing. Because permethrin binds very tightly to fabrics, once the fabric is dry, very little of the permethrin gets onto the skin.



ADDITIONAL INFORMATION

The following is the formal Centers for Disease Control and Prevention (CDC) surveillance case definition for RMSF. It is provided for your information only and should not affect the investigation or reporting of a case that fulfills the criteria in Section 2A of this chapter. (The MDPH and the CDC use the CDC case definitions to maintain uniform standards for national reporting.) For reporting to the MDPH, always use the criteria outlined in Section 2A.

Note: The most up-to-date CDC case definitions are available on the CDC website at www.cdc.gov/epo/dphsi/casedef/case_definitions.htm.

Clinical Description

A tick-borne illness that is characterized by acute onset of fever and may be accompanied by headache, malaise, myalgia, nausea/vomiting, or neurologic signs. A macular or maculopapular rash is reported in most patients, and a rash is often present on the palms and soles.

Case Classification

Probable	A clinically-compatible case with: 1) a single positive antibody titer by IFA (1:64 if IgG); OR 2) a single CF titer $\geq 1:16$; OR 3) a single titer $\geq 1:128$ by a latex agglutination, indirect hemagglutination antibody, or microagglutination test; OR 4) a four-fold rise in titer or a single titer $> 1:320$, by Proteus OX-19 or OX-2 test.
Confirmed	A clinically-compatible case with: 1) a four-fold change in antibody titer to <i>R. rickettsii</i> antigen by IFA, CF, latex agglutination, microagglutination, or indirect hemagglutination antibody test in two serum samples; OR 2) a positive PCR assay; OR 3) immunostaining of antigen in a skin biopsy or autopsy sample; OR 4) isolation and culture of <i>R. rickettsii</i> from a clinical specimen.



REFERENCES

- American Academy of Pediatrics. [Rocky Mountain Spotted Fever.] In: Pickering L.K., ed. *Red Book: 2003 Report of the Committee on Infectious Diseases, 26th Edition*. Elk Grove Village, IL, American Academy of Pediatrics; 2003: 532–534.
- Beran, G.W. *Handbook of Zoonoses, 2nd Edition: Section A: Bacterial, Rickettsial, Chlamydial, and Mycotic*. Boca Raton, CRC Press, 1994.
- Heymann, D., ed. *Control of Communicable Diseases Manual, 18th Edition*. Washington, DC, American Public Health Association, 2004.
- MDPH. *Regulation 105 CMR 300.000: Reportable Diseases, Surveillance, and Isolation and Quarantine Requirements*. MDPH, Promulgated November 4, 2005.



FORMS & WORKSHEETS

Rocky Mountain Spotted Fever

Rocky Mountain Spotted Fever



LBOH Action Steps

This form does not need to be submitted to the MDPH with the case report form. It is for LBOH use and is meant as a quick-reference guide to Rocky Mountain spotted fever (RMSF) case investigation activities.

LBOH staff should follow these steps when RMSF is suspected or confirmed in the community. For more detailed information, including disease epidemiology, reporting, case investigation, and follow-up, refer to the preceding chapter.

- ☐ Obtain copies of relevant laboratory reports.
- ☐ Fill out a MDPH *Rocky Mountain Spotted Fever Case Report Form* (attach laboratory results).
- ☐ Send the completed case report form (with laboratory reports) to the MDPH Bureau of Communicable Disease Control, Office of Integrated Surveillance and Informatics Services (ISIS).